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SYSTEM AND METHOD FOR HOUSING A SIGNAL CONNECTOR

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BACKGROUND OF THE INVENTION

5 **Field of the Invention**

The present invention relates in general to the field of information handling system signal connector housings, and more particularly to a system and method for a printed circuit board host plug Serial ATA signal connector protective housing.

Description of the Related Art

- 10 As the value and use of information continues to increase, individuals and businesses seek additional ways to process and store information. One option available to users is information handling systems. An information handling system generally processes, compiles, stores, and/or communicates information or data for business, personal, or other purposes thereby allowing users to take advantage of the
- 15 value of the information. Because technology and information handling needs and requirements vary between different users or applications, information handling systems may also vary regarding what information is handled, how the information is handled, how much information is processed, stored, or communicated, and how quickly and efficiently the information may be processed, stored, or communicated.
- 20 The variations in information handling systems allow for information handling systems to be general or configured for a specific user or specific use such as financial transaction processing, airline reservations, enterprise data storage, or global communications. In addition, information handling systems may include a variety of hardware and software components that may be configured to process, store, and
- 25 communicate information and may include one or more computer systems, data storage systems, and networking systems.

Information handling systems typically include a number of components that communicate information between each other as electrical signals sent over buses. For example, the Serial ATA industry standard defines signals to transfer information between components, such as a hard disk drive and a central processing unit (CPU),
5 over cables. One conventional configuration of processing components is to provide a separate interface card for supporting Serial ATA connections, such as through the PCI slot typically included in information handling systems. Alternatively, in order to eliminate the need for a separate interface card, Serial ATA connectors are placed directly on a printed circuit board (PCB), such as an information handling system's
10 motherboard, with a right-angle mount using Surface-Mounted Technique (SMT). SMT typically secures the Serial ATA connector to the PCB with board locks coupled to the connector and soldered to the PCB. However, this mounting scheme uses additional equipment, such as placement nozzles, to ensure correct attachment of the connector to the PCB. The Serial ATA Specification does not define PCB mounting
15 features.

One difficulty with direct mounting of a Serial ATA connector to a PCB is that the SMT board locks and electrical solder connections fail if excessive force is applied to the connector. For instance, insertion and removal forces applied to the connector from mating and unmating cables sometimes break the locks to allow
20 separation of the connector from the PCB or fracture the solder to degrade or prevent signal transfers between the connector and the PCB. Vertical forces applied to the connector or to a cable secured to a connector increase the vulnerability to SMT secured connector failure both during assembly of the information handling system at initial manufacture or during addition of components after manufacture and shipment
25 of an information handling system. As an example, an SMT Serial ATA connector secured with retention solder pads and not board locks tends to separate from a PCB with the application of as little as 2.3 lbs of force since the securing solder pads are constrained by the connector's size and available PCB surface area. If board locks are used to hold the connector to the PCB, separation of the connector from the PCB is
30 less likely, however, a vertical force of approximately 3.8 lbs against a typical Serial ATA connector mating tongue will often result in failure of the mating tongue itself. When failure of an SMT Serial ATA connector occurs during manufacture, the typical

fix is to replace the PCB, thus increasing the manufacturing costs due to scrap. When failure of an SMT Serial ATA connector occurs after manufacture, such as due to consumer addition of a Serial ATA peripheral, the complete information handling system may have to be replaced.

5 **SUMMARY OF THE INVENTION**

 Therefore a need has arisen for a method and system which secures SMT attached connectors, such as SMT Serial ATA connectors, with enhanced strength to prevent separation or breaking of the connector.

 A further need exists for a method and system which protects connector
10 components secured to a PCB from fracturing due to the application of excessive force at the connector.

 In accordance with the present invention, a method and system are provided which substantially reduce the disadvantages and problems associated with previous methods and systems for securing connectors mounted to a PCB. A protective
15 housing fits over the signal connector proximate to the connection point of a mating signal connector to absorb forces applied at the mating signal connector that otherwise would translate to the mounted signal connector or its components, such as its mounting tongue.

 More specifically, a protective housing formed with opposing openings
20 accepts a mounted Serial ATA signal connector through one opening and a mating Serial ATA cable connector through the opposing opening with the inner walls of the protective housing engaging the signal connectors to absorb forces applied during connection or disconnection of the mating cable connector or forces applied through a connected cable. In one embodiment, the protective housing adds support to reinforce
25 the mating tongue of the mounted Serial ATA signal connector by restricting movement of the cable connector relative to mounted connector. For instance, where the mounted Serial ATA signal connector is secured to a PCB with board locks, the protective housing reduces the risk of mating tongue breakage. In another embodiment, the protective housing adds support to reinforce the mounting of the

signal connector to the PCB with key slots in which the PCB is inserted so that the protective housing engages the PCB separate from the signal connector mounting. The separate coupling of the protective housing to the PCB absorbs forces applied at the signal connector that otherwise would apply to the signal connector mounting.

5 For instance, where the mounted Serial ATA signal connector is secured to a PCB with only the soldered electrical connections, the protective housing reduces the risk of soldered electrical connection breakage or fracturing. A snap lock coupled to the protective housing engages the mounted signal connector to hold the protective housing in position.

10 The present invention provides a number of important technical advantages. One example of an important technical advantage is that SMT attached Serial ATA connectors are provided with enhanced strength to help prevent separation or breaking of the connector. Serial ATA signal connectors offer relatively little surface area for mounting to a PCB, however, the protective housing enhances the mounting strength
15 by absorbing forces applied at the signal connector. Serial ATA signal connectors mounted only with soldered electrical connections are provided extra strength to reduce the risk of fracturing or separation of the connector from the PCB by the key slots that separately engage the protective housing to the PCB and absorb forces otherwise leverage against the connectors. Serial ATA signal connectors secured by
20 board locks have their mating tongues reinforced to reduce the risk of breaking by the inner surface walls of the protective housing which absorbs forces applied at a cable connector that otherwise would apply against the mating tongue.

Another example of an important technical advantage of the present invention is that components of a connector that is secured to a PCB are protected from
25 fracturing or breaking due to the application of excessive force at the connector. A separate protective housing that fits over the connection point of a signal connector and mating cable provides enhanced strength for signal connector mountings to a PCB by translating vertical forces applied at the connector to the PCB. The translation of force from the signal connector to the PCB adds strength where relatively small signal
30 connector surface area sizes reduce the available space for mounting the signal connector to the PCB. The restriction of movement of the cable connector by the inner surface of the protective housing reduces the leveraged forces applied by

movement of the cable connector to relatively fragile signal connectors, such as mating tongues. The use of a separate add-on protective housing allows selective addition of reinforcing strength where needed due to connector size constraints or expected application of excessive force.

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BRIEF DESCRIPTION OF THE DRAWINGS

The present invention may be better understood, and its numerous objects, features and advantages made apparent to those skilled in the art by referencing the accompanying drawings. The use of the same reference number throughout the
10 several figures designates a like or similar element.

Figure 1 depicts an information handling system having a protective housing aligned to insert on right-angle mounted signal connectors;

Figure 2A depicts a perspective view of a protective housing configured to fit over dual adjacent SMT Serial ATA signal connectors;

15 Figure 2B depicts a perspective view of a protective housing configured to fit over a single SMT Serial ATA signal connector;

Figure 3 depicts a protective housing being inserted over dual adjacent SMT Serial ATA signal connectors;

20 Figure 4 depicts a protective housing coupled to a PCB over dual adjacent SMT Serial ATA signal connectors; and

Figure 5 depicts a Serial ATA mating cable connector coupled to a Serial ATA signal connector through a protective housing opening.

DETAILED DESCRIPTION

25 Signal connectors mounted to information handling system printed circuit boards, such as Serial ATA signal connectors right-angle mounted with SMT, are

strengthened against potential failures due to forces applied at the signal connector. A protective housing that couples to the signal connector and/or PCB as a separate support aligns an opening to allow coupling of the signal connector with a mating cable connector so that the inner surface of the opening absorbs forces applied at the mating cable connector coupling point to reduce the risk of breakage of the signal connector mounting to the PCB or of signal connector components, such as mounting tongues. For purposes of this application, an information handling system may include any instrumentality or aggregate of instrumentalities operable to compute, classify, process, transmit, receive, retrieve, originate, switch, store, display, manifest, detect, record, reproduce, handle, or utilize any form of information, intelligence, or data for business, scientific, control, or other purposes. For example, an information handling system may be a personal computer, a network storage device, or any other suitable device and may vary in size, shape, performance, functionality, and price. The information handling system may include random access memory (RAM), one or more processing resources such as a central processing unit (CPU) or hardware or software control logic, ROM, and/or other types of nonvolatile memory. Additional components of the information handling system may include one or more disk drives, one or more network ports for communicating with external devices as well as various input and output (I/O) devices, such as a keyboard, a mouse, and a video display. The information handling system may also include one or more buses operable to transmit communications between the various hardware components.

Referring now to Figure 1, an information handling system 10 is depicted with a protective housing aligned to insert on dual adjacent SMT right-angle mounted signal connectors. Information handling system 10 has a motherboard 12 that supports information processing components, such as a CPU 14, bridge 16 and chipset 18, with wire lines disposed along motherboard 12 for communicating electronic signals between the processing components. First and second Serial ATA signal connectors 20 are mounted on motherboard 12 to communicate electronic signals received through a mated cable Serial ATA connector cable 22 from a hard disk drive 24 to processing components such as CPU 14. Each Serial ATA signal connector 20 is mounted to motherboard 12 with board locks 26 and soldered electrical connections between the signal wires of connector 20 and the wire lines of motherboard 12. A

mating tongue 28 extends from each Serial ATA connector 20 to seat in a corresponding receptacle of mating cable connector 22.

5 The mounted Serial ATA signal connector standing alone is vulnerable to failure if excessive force is applied, especially force aligned perpendicular to motherboard 12, such as forces generated during connection and disconnection of mating cable connector 22 and forces applied by an attached cable connector 22. In order to reinforce the mounting of Serial ATA connectors 20, a protective housing 30 inserts mounted connectors 20 into openings 32 which allow coupling of mating cable connector 22 in the restricted space defined by the inner walls of opening 32. Once
10 mating cable connector 22 enters opening 32, the inner walls restrict movement of cable connector 22 relative to mounted connector 20 so that forces applied by cable connector 22 that would otherwise work on mounted connector 20 are instead translated to and absorbed by protective housing 30. Thus, protective housing 30 reduces the risk of breakage of mounting tongue 28 by an inadvertent application of
15 force from mating cable connector 22. Further, protective housing 30 couples to motherboard 12 by a coupling device separate from that of mounted connector 20 to reduce the risk that excessive force applied to mounted connector 20 by cable connector 22 will separate mounted connector from motherboard 12 or will fracture the soldered electrical connections of mounted connector 20.

20 Referring now to Figures 2A and 2B, side perspective views of protective housings 30 are depicted, with Figure 2A depicting a protective housing 30 for dual adjacent mounted signal connectors and Figure 2B depicting a protective housing 30 for a single mounted signal connector. Each protective housing 30 has a snap fit latch 34 made of a flexible material to engage the rear of the mounted signal connector
25 when the mounted signal connector is inserted in opening 32. Opposing parallel key slots 36 accept a PCB and engage protective housing 30 to the PCB with an attachment separate from the mounting of the signal connector to the PCB with soldered electrical connections or board locks. The inner walls 38 of opening 32 are sized to snugly accept signal connectors inserted through opposing ends of opening
30 32 so that force applied to a connector translates to and is absorbed by protective housing 30.

Referring now to Figures 3 and 4, side perspective views depict a dual adjacent protective housing 30 fitting over dual adjacent right-angle mounted Serial ATA signal connectors 20. Mounted connectors 20 insert into one end of opening 32 to house mating tongue 28 aligned with the opposing end of opening 32 for insertion of a cable connector. As protective housing 30 fits over mounted connectors 20, slots 36 engage the PCB of motherboard 12 and, when protective housing 30 is fully inserted, snap fit latch 34 engages the rear of mounted connector 20 to lock protective housing 30 in place. As depicted by Figure 4, an installed protective housing 30 engages motherboard 12 separate from the mounting of mounted connector 20 so that inadvertent forces that otherwise would have applied against mounted connector 20 are instead absorbed by the coupling of protective housing 30. For instance, as depicted in Figure 5, a cable connector installed within protective housing 30 to communicate with mounted connector 20 is restricted from translating force in the axis perpendicular to the plane of motherboard 12, such as if the cable is pulled upon. In alternative embodiments, protective housing 30 does not have separate coupling to motherboard 12 and instead protects mating tongue 28 by restricting translation of force between a mounted and cable connector without restricting translation of force relative to motherboard 12.

Although the present invention has been described in detail, it should be understood that various changes, substitutions and alterations can be made hereto without departing from the spirit and scope of the invention as defined by the appended claims.